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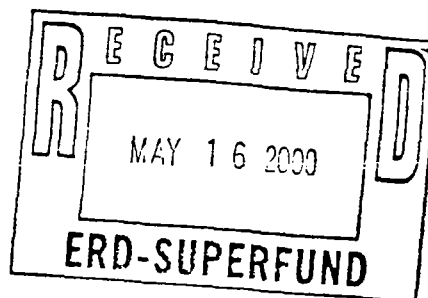
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*Transmitted via FedEx*

May 15, 2000

Mr. J. Brian von Gunten  
MDEQ-ERD  
300 South Washington Square  
Lansing, MI 48933



Re: Kalamazoo River Angler Survey Data  
Project #: 645.24.018 #2

Dear Brian:

Enclosed are the results of the Kalamazoo River Angler Survey performed in 1994 by Dr. Charles Atkin of Michigan State University. Specifically enclosed are paper copies of the survey results written by Dr. Atkins and the description of the Excel file containing the data. The enclosed disk includes an electronic copy of the raw data (Fishdata.xls) and the file containing the description of the data file (Fishcode.doc).

Please call me with any questions or comments regarding this matter.

Sincerely,

BLASLAND, BOUCK & LEE, INC.

Mark P. Brown, Ph.D.  
Senior Vice President

Enclosure

MDS/tla

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Mr. J. Brian von Gunten

May 15, 2000

Page 2 of 2

cc: Donald D. Anderson, Esq., McGuire Woods Battle & Boothe (w/out disk)  
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Michael D. Scoville, Blasland, Bouck & Lee, Inc.  
David K. Rigg, Blasland, Bouck & Lee, Inc.

## KALAMAZOO RIVER ANGLERS SURVEY Excel Codebook

A total of 690 anglers were interviewed between June and October 1994. Dozens of questions were posed, and the answers were marked on hard copies of the questionnaire. Using this codebook, the data were entered into a computer file. Each column on the file contains one code number (ranging from 0 to 9) to represent the answer marked by the interviewer for each question posed (the only exception is Column 2, which has six digits of the telephone number).

The responses of each angler are entered into 133 columns. It should be noted that many of the follow-up questions were not posed to every individual because they did not perform certain behaviors measured on screening items; thus, many "0" codes appear for each angler in the survey.

The data are saved into an Excel file (in columns numbered 1 – 133), which can be converted and read into a data analysis program such as SPSS in order to compute the frequencies, means and cross-tabulations that are presented in the technical report submitted in 1995.

This codebook presents the questionnaire item, identifies the column number (Col), and lists the response categories and the numerical codes that are entered.

### **Col 1 Area Code:**

5 = 517

6 = 616

### **Col 2 Phone number (first six digits)**

### **Col 3 County:**

1 = KALAMAZOO

2 = CALHOUN

3 = BARRY

4 = VAN BUREN

5 = OTTAWA

6 = EATON

7 = ALLEGAN

### **Col 4 Month of survey:**

1 = June

2 = July

3 = August

4 = September

5 = October

**Col 5 Type of sample**

- 1 = Recreational angler list
- 2 = Licensed angler list

**Col 6 When was the last time that you went fishing?**

*Note: the time frame for recent fishing events differs according to the month when the interview was conducted*

- 1 WITHIN PAST TWO WEEKS
- 2 WITHIN PAST MONTH
- 3 EARLY SPRING (June/July interviews)
- 3 EARLY SUMMER (August/September interviews)
- 3 THIS SUMMER (October interviews)
- 4 THIS SPRING (August/September/October interviews)
- 4 LAST WINTER (June/July interviews)
- 5 LAST FALL (June/July interviews)
- 5 LAST WINTER (August/September/October interviews)
- 6 LAST SUMMER (June/July interviews)
- 6 SUMMER 1993 (August/September interviews)
- 6 LAST FALL (October interviews)
- 7 SUMMER 1993 (August/September/October interviews)
- 7 BEFORE SUMMER 1993 (June/July interviews)
- 8 BEFORE SUMMER 1993(August/September/October interviews)

**Col 7 Did you fish between December and February? (July/July interviews)**

Did you fish between March and May? (August interviews)

Did you fish during June, July, or August? (September/October interviews)

*Note: the season referred to differs according to the month when interview was conducted*

- 1 YES
- 2 NO

**Col 8 About how often did you go fishing?**

- 1 OFTEN
- 2 ONCE A MONTH
- 3 TWO/THREE TIMES PER MONTH
- 4 FOUR/FIVE TIMES PER MONTH
- 5 MORE OFTEN

**Col 9 Please tell me the approximate locations where you usually fished last**

<winter/spring/summer>...Which lakes and rivers? PROBE: Did you fish at any other spots? IF KALAMAZOO RIVER: Which section of the river did you fish? (not coded: open-end answers typed on separate text file)

**Col 10** When you caught legal-size fish last <winter/spring/summer>, did you usually release them or take the fish home to be eaten in your household? IF TAKE HOME: Would you say you took home all of the fish you caught, most of the fish, about half, or less? IF RELEASE: Did you release all of the fish or most of the fish?

- 1 TAKE ALL
- 2 TAKE MOST
- 3 TAKE HALF
- 4 LESS/RELEASE MOST
- 5 RELEASE ALL

**Col 11** Did you fish between September and November? (June/July interviews)  
Did you fish between December and February? (August interviews)  
Did you fish between March and May? (September/October interviews)

- 1 YES
- 2 NO

**Col 12** About how often did you go fishing?

- 1 OFTEN
- 2 ONCE A MONTH
- 3 TWO/THREE TIMES PER MONTH
- 4 FOUR/FIVE TIMES PER MONTH
- 5 MORE OFTEN

**Col 13** Please tell me the approximate locations where you usually fished last <fall/winter/spring>...Which lakes and rivers? PROBE: Did you fish at any other spots? IF KALAMAZOO RIVER: Which section of the river did you fish? *(not coded: open-end answers typed on separate text file)*

**Col 14** When you caught legal-size fish last <fall/winter/spring>, did you usually release them or take the fish home to be eaten in your household? IF TAKE HOME: Would you say you took home all of the fish you caught, most of the fish, about half, or less? IF RELEASE: Did you release all of the fish or most of the fish?

- 1 TAKE ALL
- 2 TAKE MOST
- 3 TAKE HALF
- 4 LESS/RELEASE MOST
- 5 RELEASE ALL

**Col 15** Have you been fishing in Michigan during the past two weeks?

- 1 YES
- 2 NO

**Col 16** Where did you fish most recently?  
(not coded: open-end answers typed on separate text file)

**Col 17** How many days did you fish there in the past two weeks?

Number of days coded as 1 2 3 4 5 6 7 8 9(9 = 9-14)

**Col 18-29** What species of fish did you catch at that location? PROBE: Did you catch any other species there?  
FOR EACH SPECIES: Altogether, about how many of these <species> did you take home to be eaten by yourself or other people? PROBE: Can you please estimate the total number you took home?

Number of fish coded below as 1 2 3 4 5 6 7(7 = 7-10) 8(8 = 11-15) 9(9 = 16 or more)

Col 18 CARP

Col 19 CATFISH

Col 20 SUCKERS

Col 21 BASS

Col 22 PIKE

Col 23 WALLEYE

Col 24 TROUT

Col 25 BLUEGILL

Col 26 SUNFISH

Col 27 PERCH

Col 28 SALMON

Col 29 OTHER

**Col 30** Where else did you fish in the last two weeks?  
(not coded: open-end answers typed on separate text file)

**Col 31** How many days did you fish there in the past two weeks?

Number of days coded as 1 2 3 4 5 6 7 8 9(9 = 9-14) .

**Col 32–43** What species of fish did you catch at that location? PROBE: Did you catch any other species there?

FOR EACH SPECIES: Altogether, about how many of these <species> did you take home to be eaten by yourself or other people? PROBE: Can you please estimate the total number you took home?

Number of fish coded below as 1 2 3 4 5 6 7(7 = 7-10) 8(8 = 11-15) 9(9 = 16 or more)

Col 32 CARP

Col 33 CATFISH

Col 34 SUCKERS

Col 35 BASS

Col 36 PIKE

Col 37 WALLEYE

Col 38 TROUT

Col 39 BLUEGILL

Col 40 SUNFISH

Col 41 PERCH

Col 42 SALMON

Col 43 OTHER

**Col 44** Did you fish anywhere else in the past two weeks?

*(not coded: open-end answers typed on separate text file)*

**Col 45** How many days did you fish there in the past two weeks?

Number of days coded as 1 2 3 4 5 6 7 8 9(9 = 9-14)

**Col 46-57** What species of fish did you catch at that location? PROBE: Did you catch any other species there?

FOR EACH SPECIES: Altogether, about how many of these <species> did you take home to be eaten by yourself or other people? PROBE: Can you please estimate the total number you took home?

Number of fish coded below as 1 2 3 4 5 6 7(7 = 7-10) 8(8 = 11-15) 9(9 = 16 or more)

Col 46 CARP

Col 47 CATFISH

Col 48 SUCKERS

Col 49 BASS

Col 50 PIKE

Col 51 WALLEYE

Col 52 TROUT

Col 53 BLUEGILL

Col 54 SUNFISH

Col 55 PERCH

Col 56 SALMON

Col 57 OTHER

**Col 58** In the past two weeks, did you eat any fish that were caught in the west part of the state?

1 YES

2 NO

**Col 59-90** What kinds of fish did you eat?

PROBE: Did you eat any other species?

FOR EACH KIND OF FISH, REPEAT NEXT TWO QUESTIONS: How many <species> meals did you eat in the last two weeks? When you eat a meal of <species>, what is the total amount that you consume: is it a small portion... say, four or five ounces, or a large amount greater than ten ounces, or in between?

Are there any other adults in your household who ate fish in the last two weeks?  
FOR EACH ADULT: What kinds did they eat? How many meals?

Are there any children in your household who ate fish in the past two weeks?  
FOR EACH CHILD: What kinds did they eat? How many meals?

*First fish mentioned---*

**Col 59** Species:

- 1 Carp / Catfish / Suckers
- 2 Bluegill /Sunfish
- 3 Perch
- 4 Bass
- 5 Pike
- 6 Walleye
- 7 Trout
- 8 Salmon
- 9 Other

**Col 60** Number of meals eaten by Self coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 61** Size of meal

- 1 Small (*five or fewer ounces*)
- 2 In between (*six to nine ounces*)
- 3 Large (*ten or more ounces*)

**Col 62** Number of meals eaten by Adult #2 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 63** Number of meals eaten by Adult #3 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 64** Number of meals eaten by Child #1 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 65** Number of meals eaten by Child #2 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 66** Number of meals eaten by Child #3 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

*Second fish mentioned---*

**Col 67** Species:

- 1 Carp / Catfish / Suckers
- 2 Bluegill /Sunfish

- 3 Perch
- 4 Bass
- 5 Pike
- 6 Walleye
- 7 Trout
- 8 Salmon
- 9 Other

**Col 68** Number of meals eaten by Self coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 69** Size of meal

- 1 Small (*five or fewer ounces*)
- 2 In between (*six to nine ounces*)
- 3 Large (*ten or more ounces*)

**Col 70** Number of meals eaten by Adult #2 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 71** Number of meals eaten by Adult #3 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 72** Number of meals eaten by Child #1 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 73** Number of meals eaten by Child #2 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 74** Number of meals eaten by Child #3 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

*Third fish mentioned---*

**Col 75** Species:

- 1 Carp / Catfish / Suckers
- 2 Bluegill /Sunfish
- 3 Perch
- 4 Bass
- 5 Pike
- 6 Walleye
- 7 Trout
- 8 Salmon
- 9 Other

**Col 76** Number of meals eaten by Self coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 77** Size of meal

- 1 Small (*five or fewer ounces*)

- 2 In between (*six to nine ounces*)
- 3 Large (*ten or more ounces*)

**Col 78** Number of meals eaten by Adult #2 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 79** Number of meals eaten by Adult #3 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 80** Number of meals eaten by Child #1 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 81** Number of meals eaten by Child #2 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 82** Number of meals eaten by Child #3 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

*Fourth fish mentioned---*

**Col 83** Species:

- 1 Carp / Catfish / Suckers
- 2 Bluegill /Sunfish
- 3 Perch
- 4 Bass
- 5 Pike
- 6 Walleye
- 7 Trout
- 8 Salmon
- 9 Other

**Col 84** Number of meals eaten by Self coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 85** Size of meal

- 1 Small (*five or fewer ounces*)
- 2 In between (*six to nine ounces*)
- 3 Large (*ten or more ounces*)

**Col 86** Number of meals eaten by Adult #2 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 87** Number of meals eaten by Adult #3 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 88** Number of meals eaten by Child #1 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 89** Number of meals eaten by Child #2 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 90** Number of meals eaten by Child #3 coded as 1 2 3 4 5 6 7 8 9(9 = 9 or more)

**Col 91** IF ANYONE ATE FISH: Of all the fish eaten in your household in the past two weeks, were any of these fish caught longer than two weeks ago and then frozen, smoked, or dried?

IF YES: Would you say all of the fish were caught earlier, most of them, about half, or a few?

- 1 NO
- 2 YES: ALL
- 3 YES: MOST
- 4 YES: HALF
- 5 YES: A FEW

**Col 92** Methods used for preparing and cooking fish in your household. In each case, tell me whether the method is employed usually, sometimes, or never. First, lets deal with bottom feeders like carp and suckers. Do you ever eat this type of fish?

- 1 YES
- 2 NO

**Col 93** IF YES: Do you fillet these fish (usually, sometimes, or never)?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 94** Do you remove or puncture the skin before cooking?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 95** Do you trim the fat from the fish?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 96** Do you fry the fish?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 97** Do you eat the liver?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 98** Do you eat the eggs?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 99** Second, do you ever eat smallmouth or largemouth bass?

- 1 YES
- 2 NO

**Col 100** IF YES: Do you fillet these fish (usually, sometimes, or never)?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 101** Do you remove or puncture the skin before cooking?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 102** Do you trim the fat from the fish?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 103** Do you fry the fish?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 104** Do you eat the liver?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 105** Do you eat the eggs?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 106** What other type of fish do you eat most frequently?

- 1 Carp / Catfish / Suckers
- 2 Bluegill /Sunfish
- 3 Perch
- 4 Bass
- 5 Pike
- 6 Walleye
- 7 Trout
- 8 Salmon
- 9 Other

**Col 107** IF YES: Do you fillet these fish (usually, sometimes, or never)?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 108** Do you remove or puncture the skin before cooking?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 109** Do you trim the fat from the fish?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 110** Do you fry the fish?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 111** Do you eat the liver?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 112** Do you eat the eggs?

- 1 USUALLY
- 2 SOMETIMES
- 3 NEVER

**Col 113** Are you aware of any Fish Consumption Advisory warnings issued by the Michigan Department of Public Health?

IF NO OR NOT SURE: These warnings tell which bodies of water contain certain types of fish that are unsafe to eat because of toxic chemical contamination. Have you heard anything about that?

- 1 YES: AWARE
- 2 NO: BUT HEARD
- 3 NO: NOT HEARD ANYTHING

**Col 114** Do you know if the warning applies to any rivers or lakes in the southwest part of the state?

- 1 NO
- 2 NOT SURE
- 3 YES

**Col 115** IF YES: Which bodies of water?

- 1 KALAMAZOO RIVER
- 2 PORTAGE CREEK
- 3 LAKES
- 4 DON'T KNOW

**Col 116** As a result of a consumption advisory warning, have you changed the type of fish species that you attempt to catch?

- 1 NO
- 2 YES

**Col 117** IF YES: Which fish do you try to avoid?

- 1 CARP / CATFISH / SUCKERS

- 2 BASS
- 3 PIKE
- 4 WALLEYE
- 5 TROUT
- 6 BLUEGILL / SUNFISH
- 7 PERCH
- 8 SALMON
- 9 OTHER

**Col 118** Have you avoided fishing in certain locations because of the warnings?

- 1 NO
- 2 YES

**Col 119** Have you avoided eating all fish from waters specified in the advisory?

- 1 NO
- 2 YES

**Col 120** IF NO in 119: Have you avoided eating certain types of fish species from these waters?

- 1 YES
- 2 NO

**Col 121** IF NO in 119: Have you reduced the quantity of fish you eat from these waters?

- 1 YES
- 2 NO

**Col 122** IF NO in 119: Have you changed the way that you trim or cook the fish from these waters?

- 1 YES
- 2 NO

**Col 123** Besides fish, have you attempted to catch any other types of freshwater animals such as turtles, frogs, or crayfish during the past year?

- 1 YES
- 2 NO

**Col 124** Have you attempted to catch any of these animals in the past two weeks?

- 1 YES
- 2 NO

*The following items in the survey were hand coded because there are only N=7 respondents had attempted to catch these animals in the past two weeks:*

What were the animals you attempted to catch and where did you try to catch them?

Did you take any of these animals home to be eaten by yourself or other people? Which ones?

Did you eat any of these animals in the last two weeks?

What kinds of animals did you eat? How many <animal> meals did you eat in the last two weeks?

When you eat a meal of <species>, what is the total amount that you consume...is it a small portion (say, four or five ounces) or a large amount (greater than ten ounces), or in between?

Are there any other adults in your household who ate these animals in the last two weeks?

FOR EACH ADULT: What kinds did they eat? How many meals?

Are there any children in your household who ate these animals in the past two weeks?

FOR EACH CHILD: What kinds did they eat? How many meals?

IF ANYONE ATE ANIMALS: Of all the animals eaten in your household in the past two weeks, were any of these caught longer than two weeks ago and then frozen, smoked, or dried?

IF YES: Would you say all of the animals were caught earlier, most of them, about half, or a few?

**Col 125** What is your age level... are you in your 20's, 30's, 40's, 50's, 60's, or older?

- 1 TEENS
- 2 20's
- 3 30's
- 4 40's
- 5 50's
- 6 60's
- 7 OLDER
- 8 REFUSED

**Col 126** About how many years have you been fishing in Michigan?

- 1 LESS THAN ONE
- 2 1-2
- 3 3-4
- 4 5-10
- 5 11-15
- 6 16-20
- 7 21-30
- 8 MORE THAN 30

**Col 127** How would you describe your fishing ability: are you a beginner, intermediate, advanced, or expert?

- 1 BEGINNER
- 2 INTERMEDIATE
- 3 ADVANCED
- 4 EXPERT
- 5 NOT SURE

**Col 128** How many persons currently live in your household? Number: 1 2 3 4 5(5 or more)

**Col 129** What is the highest level of schooling that you completed?

- 1 LESS THAN 12TH GRADE
- 2 HIGH SCHOOL GRAD
- 3 SOME COLLEGE/TECH SCHOOL
- 4 FOUR-YEAR COLLEGE GRAD
- 5 GRADUATE SCHOOLING
- 6 REFUSED

**Col 130** Which of the following categories best describes your current employment situation?  
Are you a full-time worker, part-time worker, seasonal worker, unemployed, retired, student, or homemaker?

- 1 FULL-TIME
- 2 PART-TIME
- 3 SEASONAL
- 4 UNEMPLOYED
- 5 RETIRED
- 6 STUDENT
- 7 HOMEMAKER

**Col 131** Which of the following describes your ethnic background: White, African-American, Hispanic, Native American, Asian-American, or Other?

- 1 WHITE
- 2 AFRICAN-AMERICAN
- 3 HISPANIC
- 4 NATIVE-AMERICAN
- 5 ASIAN-AMERICAN
- 6 OTHER
- 7 REFUSED

**Col 132** Is your total household income above or below \$30,000 per year?

IF ABOVE: Is it above or below \$40,000? IF ABOVE: Is it above \$50,000 per year?

IF BELOW: Is it above or below \$20,000 per year? IF BELOW: Is it above \$10,000 per year?

1 UNDER \$10

2 \$10-19

3 \$20-\$29

4 \$30-\$39

5 \$40-\$49

6 ABOVE \$50

7 REFUSED

**Col 133** RESPONDENT GENDER:

1 MALE

2 FEMALE

## KALAMAZOO RIVER ANGLERS SURVEY

A survey study of anglers residing near the Kalamazoo River basin was conducted during the months of June to October via long-distance telephone interviews. During each of the five months, N=138 completed interviews were obtained by Communication Research Institute staff calling from East Lansing and Grand Rapids offices.

### Research Methodology

Because it is important to attain a representative sample of individuals from this geographic region, two methods were combined to create the sampling frame. First, slightly more than half of the telephone numbers were supplied by the firm Survey Sampling Inc., which has a widely-respected data base of several million households that are classified according to recreational pursuits such as fishing. This list provided a high proportion of active anglers, including some whose names don't appear on the Michigan Department of Natural Resources computerized list (either because they are not licensed or because the available listing does not include all current anglers).

The other major portion of the sample was randomly drawn from the 1993 MDNR printout of the Resident Annual, Senior Resident, and Sportsperson's licensees. This list contains names and addresses but not telephone numbers; the numbers for about three-fourths of the sampled licensees were obtained from local telephone directories and operator assistance. The demographic characteristics and fishing backgrounds of the two sets of respondents are very similar, so the Survey Sampling list and the MDNR list were merged for the analyses of findings.

The sampling methodology employed in this study provides a cross-section of all anglers at least 17 years old, representing all demographic and geographic segments of the population and excluding none except for the tiny proportion who have no telephones. This telephone mode of collecting data is superior to a mail survey that suffers from low response rates, particularly among the less literate subgroups. It should be recognized that all standard research methods other than in-person riverside intercepts probably reach a relatively small number of low-income subsistence anglers.

Interviews were successfully completed with total of N=690 anglers out of N=981 who were contacted, which is a completion rate of 70%. This rate is above average for telephone surveys, especially considering that many of those who did not participate said they had not fished in the past year.

The sample was geographically stratified by county unit. Based on the most recent MDNR licensed angler figures for southwestern Michigan counties, numerical quotas of completed interviews were established. Interviews were concentrated in six counties located nearest to the heavily-fished portions of the Kalamazoo River: Allegan, Barry, Calhoun, Eaton, Kalamazoo, and Ottawa. Two other counties were partially represented: a large quota for the slightly distant Van Buren County, and a small number from the relatively distant Jackson County. The following number of interviews were completed:

121	Kalamazoo County
108	Allegan County
106	Ottawa County
100	Calhoun County
87	Barry County
86	Van Buren County
64	Eaton County
18	Jackson County

The target sample size of N=690 completed interviews is based on a statistical formula indicating the minimum number to provide a reliable estimate of region-specific fish consumption rates. The proposed level of precision is a sampling error margin of two grams per day above or below the expected consumption rate of 18 grams per day identified by West in his 1989 study of Michigan fish consumption patterns.

The survey questionnaire was developed and refined over several months of discussions and elaborate pretesting. To avoid biases in recall of both fishing activities and consumption patterns, most of the questions focus on the most recent two-week period prior to the interview. A Quality Assurance program was used to maximize the quality of the information collected. This involved extensive training of interviewers, random monitoring of on-going interviews, and a validation of survey responses via follow-up interviews with a 10% subsample of respondents.

This report presents the wording of each question and the array of answers with percentage figures and mean scores. In addition, cross-tabulations were performed on key items, comparing answers of males vs. females, older vs. younger anglers, whites vs. minorities, highly educated vs. less educated, higher income vs. moderate income vs. lower income households, those working full-time vs. non-full time, anglers with higher vs. lower fishing expertise, anglers living in counties nearer vs. farther from the Kalamazoo River, and those knowing about the Advisory and its applicability to the Kalamazoo River vs. those lacking knowledge. The detailed cross-tabulation data are displayed in Appendix A, and significant findings are cited where appropriate in the texts.

In interpreting the percentage figures presented in this report, it should be noted that the sampling error varies according to the prevalence of the behavior being measured:

-- For answers that are given by approximately half of the overall sample (e.g., the 48% who fished in the two weeks prior to the survey, or the 42% who avoid fishing in waters specified in the MDPH Advisory), the margin of error is plus or minus 3.8% based on the N=690 anglers who were interviewed. This is the maximum possible error, and the error rate declines as the percentage figures deviate further above or below 50%.

-- If the behavior is relatively rare or universal (e.g., the 10% who caught perch in the two-week period, or the 94% who never eat bottomfeeder species), the error margin is approximately 2% above or below the obtained percentage.

-- If the behavior is performed by about one-fifth (or four-fifths) of the sample, the error is approximately 3%. For example, 25% of all respondents in the sample know that the MDPH Advisory applies to the Kalamazoo River, with a sampling error rate of 3%. This means that it is almost certain that the awareness figure for the total population of anglers residing in the basin is within 3% of the percent found with this sample; it falls in the range of 22% to 28%.

These error margins are computed at the 95% level of confidence; the chances are 95 out of 100 that the true population figure is within the specified range above or below the sample percentage.

The interviews were conducted between 5 pm and 9 pm on weekday evenings, primarily during the first two weeks of each month during June, July, August, September, and October, 1994. Respondents were told that the interviewer was "conducting a fishing study in the western part of Michigan" with a "random sample" of anglers to "find out how often they fish and how many fish they catch and eat." The first question asked about the most recent fishing event:

"When was the last time that you went fishing?"

48% WITHIN PAST TWO WEEKS  
17% WITHIN PAST MONTH  
24% ONE TO SIX MONTHS PRIOR  
11% LONGER THAN SIX MONTHS AGO

This initial question had three purposes: to establish that the individual was a current angler who fished at least once within the past year, to determine whether the respondent qualified for the questions about fishing during previous seasons, and to identify the time of the most recent fishing event. Almost half had fished during the two-week period prior to the survey, and the vast majority had fished within the previous several months. These findings indicate that the sample yielded a satisfactory number of active anglers.

The percentage who fished within the two weeks prior to the interview varies according to demographic characteristics and fishing ability. As shown in Appendix A, 61% of the advanced and expert anglers fished, compared to 42% of the beginner and intermediate subgroup. Males are more likely to have fished than are females, and those with more education are slightly more likely to have fished. The percentage of non-white anglers who fished is much lower than whites, but it should be noted that the sample size of this minority segment is very small, so the figures are not as reliable. The rate of fishing is somewhat higher among anglers who are aware of the MDPH advisory and who know that it applies to the Kalamazoo River. Finally, there is little difference between younger vs. older anglers, between residents of counties closest to the river vs. those who live further away, and among anglers from various household income segments.

## Fishing Activity in Two Prior Seasons

Before posing detailed questions about current activities, respondents were asked about fishing during each of two seasons prior to the survey; the specific seasons of the year depended on the month that the interview was conducted:

- anglers interviewed during June and July were initially asked about fishing during the previous winter and then asked about the previous fall;
- those interviewed during August were asked about spring and then winter;
- the September and October subsamples were asked about the immediately preceding summer and then spring.

This questioning technique provided retrospective accounts covering all four seasons from Fall 1993 to Summer 1994, as a supplement to the rolling reports of recent fishing activities across the prime fishing period from mid-May to late October. Here is the pair of questions asked during the September and October interviews (*wording for earlier months of the survey is presented in italics*):

"I'd like to ask about your fishing activity over the past year. Let's start with last summer (*spring/winter*)... did you fish between June and August (*March and May / December and February*)?"

<SUBSEQUENT QUESTION: "Let's go back to last spring (*winter/fall*)... did you fish between March and May (*December and February/September and November*)?">

	<i>Summer</i> N=276	<i>Spring</i> N=414	<i>Winter</i> N=414	<i>Autumn</i> N=276
YES	78%	56%	36%	52%
NO	22%	44%	64%	48%

Almost four-fifths the respondents reported that they had fished during the summer months of 1994, and more than half reported fishing in spring 1994 and the fall of 1993. Less than two-fifths said that they had fished in the winter of 1993-94. Fully 89% fished in at least one of the two seasons prior to the survey.

For each angler who reported fishing in a particular season, several follow-up questions were posed, beginning with this item that deals with the frequency that they fished:

"About how often did you go fishing... would you say once a month, two or three times per month, four or five times per month, or more often?"

Times per Month	<i>Overall</i>	<i>Summer</i>	<i>Spring</i>	<i>Winter</i>	<i>Autumn</i>
MORE OFTEN	11%	16%	9%	7%	10%
FOUR-FIVE TIMES	13%	17%	14%	8%	13%
TWO-THREE TIMES	16%	24%	19%	9%	13%
ONCE A MONTH	12%	16%	11%	8%	12%
LESS OFTEN	4%	5%	3%	4%	4%
DIDN'T FISH	44%	22%	44%	64%	48%

Among those who fished in a particular season, the vast majority went fishing more than once per month. To compute the total frequency of fishing for each three-month season of the year, the mean number of times per month was multiplied by three. It is estimated that the average number of fishing days in each three-month season is approximately 10.0 in the summer, 9.8 in the autumn, 9.7 in the spring, and 9.5 in the winter. Thus, those who pursue fishing in any season tend to fish about the same number of days regardless of the time of the year.

When the anglers who don't fish in a particular season are also included in the computations (e.g., averaging in 0 days for each of the 64% who never fished in the winter months), the average frequency for all respondents in the sample drops to 7.8 days during the summer months, 5.4 days in the spring, 5.1 days in autumn, and 3.4 days in winter. Across the overall sample, it can be estimated that the anglers fished a total of almost 22 days in the full year.

Those who fished during a particular season were then asked to identify the lakes and rivers that they visited:

"Please tell me the approximate locations where you usually fished last summer (spring/winter/fall)...Which lakes and rivers? PROBE: Did you fish at any other spots? IF KALAMAZOO RIVER: Which section of the river did you fish?"

*Bodies of water fished at least once in previous seasons:*

7% KALAMAZOO RIVER  
21% OTHER RIVERS  
82% INLAND LAKES  
11% GREAT LAKES

During the two seasons prior to the interview, 7% of all respondents reported that they had fished in the Kalamazoo River; one-fifth visited another river or creek such as the Grand River. More than four-fifths fished in an inland lake; indeed, the typical angler fished in an average of two lakes. Several hundred different lakes were mentioned by these anglers. One-tenth fished in one of the Great Lakes; Lake Michigan was chosen in the vast majority of these cases. Only 11% did not fish in the previous two seasons. The figures above total far more than 89% because many anglers visited more than one type of fishing site.

In order to determine what anglers generally did with fish caught at these locations, respondents were asked to estimate the proportion of fish that they released vs. took home for consumption. The two-stage question presented below was posed to those anglers who had fished in each of the seasons prior to the survey (respondents who fished in both of the preceding seasons answered twice). The findings that are displayed at the top of the next page represent an average of the data across all four seasons, based only those anglers who actually fished in one or both of the seasons that they were asked about.

"When you caught legal-size fish last summer (spring/winter/fall), did you usually release them or take the fish home to be eaten in your household?"

IF TAKE HOME: "Would you say you took home all of the fish you caught, most of the fish, about half, or less?"

IF RELEASE: "Did you release all of the fish or most of the fish?"

31% TAKE HOME ALL  
21% TAKE HOME MOST  
15% TAKE HALF/RELEASE HALF  
15% RELEASE MOST  
18% RELEASE ALL

Among those catching legal-size fish, about half took home most or all of the fish, while one-third released most or all of the fish. The rest took home about half and released about half. Thus, a substantial number of the fish caught were released rather than taken home to be eaten by household members. Assuming that "All" is 100%, "Most" is 75%, and "Half" is 50%, it can be estimated that about 42% of all caught fish are released and that the other 58% are taken home.

The proportion of the overall sample who take home "all" fish (31%) or "most" fish (21%) combines for a total of 52%. Data in Appendix A show which subgroups score above this sample-wide figure: those with high education, older anglers, and those with lower household income. There is little difference on the other background factors.

## Recent Fishing Activity

All respondents were asked about their fishing during the two-week period prior to the interview. Those who had fished answered a series of questions dealing with the locations, number of days, types of fish caught, and number of each species that were taken home. The initial question sought to determine which anglers had fished recently; the results are presented for the overall five-month interviewing period and for each month separately:

"Now I'd like to ask you about some of your more recent fishing activities. Have you been fishing in Michigan during the past two weeks?"

	Overall	June	July	August	Sept	October
YES	48%	52%	64%	57%	46%	24%
NO	52%	48%	36%	43%	54%	76%

Across the five-month interviewing time frame, approximately half of all anglers reported that they had fished during the previous two-week period. Recent fishing reaches the highest rate in the month of July, followed by August, June, and September; only one-quarter fished in October.

The 48% of respondents who said that they had fished within two weeks were first asked to identify the location of their most recent fishing activity; this was followed by questions about the frequency of fishing at that site and the quantity of various species that were caught there. The same series of questions was repeated for the 10% of all anglers who said they had also fished at a second location during the two-week period, and asked once again for the handful who fished in three different bodies of water. Because almost no anglers traveled to a fourth site, the questioning was cut off at that point. This is the wording of the opening question for each of the three locations:

"Where did you fish most recently?"

"Where else did you fish in the last two weeks?"

"Did you fish anywhere else in the past two weeks?"

*Bodies of water fished at least once in prior two weeks:*

2%	KALAMAZOO RIVER
8%	OTHER RIVERS
36%	INLAND LAKES
6%	GREAT LAKES

Very few of the anglers living in the region of the Kalamazoo River basin actually fished in the river during the two weeks prior to the survey. Most who fished chose inland lakes (usually located nearby in southwest Michigan, but some in northern Michigan or other locales), while modest proportions traveled to one of the Great Lakes (primarily Lake Michigan) or to other rivers (most often the Grand River).

Those who fished at a particular location were then asked to report the total number of days that they visited there; the question was subsequently repeated if they said that they visited a second or third site:

"How many days did you fish there in the past two weeks?"

	<i>First Site</i>	<i>Second Site</i>	<i>Third Site</i>
FISHED ONE DAY	16%	5%	0%
TWO DAYS	13%	2%	1%
THREE DAYS	7%	1%	0%
FOUR DAYS	6%	0%	0%
FIVE/SIX DAYS	2%	1%	0%
SEVEN DAYS	2%	0%	0%
EIGHT OR MORE	2%	1%	0%
DID NOT FISH	52%	90%	99%

During the two-week period prior to the interview, 48% of the anglers fished at one or more locations: 38% at one site only, 9% at two different sites, and 1% at three sites. At each lake or river site, the majority of those who had fished there reported that they visited once or twice, but some went back a number of times. The N=334 who fished at the first location visited an average of 2.6 days. The average frequency totaled 5.0 days for the subset of N=65 who also went to a second location and 7.3 days for the N=7 who fished at three locations (because certain anglers fished as many as six or eight days, the mean number of days is somewhat higher than the median number of days). Summing across all anglers who fished during the previous two weeks, fishing occurred on a total of 1,048 days.

Anglers who fished one or more times at each location were next asked to identify the types of fish that they caught; the follow-up question inquired about the number of each species that they took home. Probes were employed in each case to generate the fullest and most accurate findings. These questions were repeated for up to three locations:

"What species of fish did you catch at that location?" PROBE: "Did you catch any other species there?"

FOR EACH SPECIES: "Altogether, about how many of these <species> did you take home to be eaten by yourself or other people?" PROBE: "Can you please estimate the total number you took home?"

In presenting the answers to these questions, the chart on the next page displays three columns of figures. The first shows the percentage of the overall sample that took home at least one of each species from all of the sites that they fished. It is important to note that the computations are based on N=690 respondents, encompassing both those who fished in the previous two weeks and those who did not fish during that time period (the percentages would be much higher if the base for computation was limited only to the subset of respondents who fished during those weeks). The second column shows the total number of fish that anglers took home (summed across all sites that they fished). The third column shows the mean number of fish per angler; these averages are based on the subset of s who fished during the two weeks.

*Species caught in prior two weeks:*

<i>Took Any</i>	<i>Total Fish</i>	<i>Mean Number</i>	
23%	1,895	11.8	BLUEGILL
17%	485	4.2	BASS
11%	757	10.0	PERCH
5%	235	7.1	SUNFISH
5%	168	5.1	WALLEYE
5%	65	2.0	PIKE
4%	128	4.7	TROUT
1%	17	2.1	CATFISH
0.8%	14	2.8	SALMON
0.4%	3	1.0	SUCKERS
0.3%	6	3.0	CARP
4%	153	5.5	OTHER

Of the N=334 anglers who fished during the two-week period, almost half took home one or more bluegill; these N=161 bluegill-takers constitute 23% of the entire sample of N=690. The total of 1,895 bluegill taken home represents an average of 11.8 per bluegill-taker; this can also be computed as an average of 5.7 bluegill per angler who fished for any species over the two weeks measured in the survey, and 2.7 bluegill per respondent in the overall sample.

The second highest proportion took home bass, but the average number of bass per bass-taker is far lower. The only other species taken home by a substantial number of anglers is perch. The next four species on the list (sunfish, walleye, pike, and trout) were taken home by just 4% or 5% of all respondents.

Focusing on the subset of bottomfeeder species, the findings show that very few were taken home. When the quantities of catfish, suckers, and carp are totaled across all sites, only 26 of these fish were caught and then taken home to be eaten in a 14-day period of time, or about two per day among all of the anglers who were surveyed. This number constitutes less than 1% of the grand total of fish that were taken home. The 26 fish represent an average of merely one-tenth of a fish per angler who fished during the two-week period. Based on the full sample size, this amounts to 0.04 fish per respondent living in the southwest Michigan counties. The subgroup differences in proportions catching bottomfeeder species are presented in Appendix A; there is a slight tendency for beginner/intermediate and minority anglers to catch these fish.

Those who are most knowledgeable about the Advisory aren't less likely to catch bottomfeeders.

A grand total of 3,926 fish were taken home for eating by the N=334 anglers who said that they fished during the two weeks prior to the interview. This amounts to 11.8 fish per angler who fished (or 5.7 fish for each respondent in the overall sample). Of course, a far greater number of fish were actually *caught* than were taken home by these anglers; based on the data in the first section indicating that 42% of caught fish are released, it can be projected that approximately 6,769 were caught (of which 2,843 were released).

In addition to these two-week figures, the rate of catching and taking home fish can also be examined on a daily basis. The 3,926 fish were taken home across 1,048 fishing days, which is an average of 3.7 fish per day. Projecting to fish caught (both taken home and released), it is estimated that an average of 6.5 fish are caught per day.

## Recent Fish Consumption Patterns

One of the central sections of the survey focused on consumption of fish that were caught. To provide the most accurate recall data, the questions were limited to eating that occurred within the previous two weeks. The scope was restricted to fish caught recreationally rather than purchased fish, and further restricted to fish caught in the west Michigan region rather than more distant locations, but the scope did encompass both fresh and preserved fish. Thus, there is not necessarily a close relationship between the fish-eating patterns and the recent fish-catching patterns reported in the previous section.

The interviewer began by asking about fish personally eaten by the angler before proceeding to questions about other family members:

"The next few questions ask about the fish that are eaten in your household. We're only interested in fish caught by you or someone else you know... not fish from a market or restaurant. In the past two weeks, did you eat any fish that were caught in the west part of the state?"

	Overall	June	July	August	Sept	October
YES	27%	31%	31%	31%	19%	25%
NO	73%	69%	69%	69%	81%	25%

More than one-fourth of the anglers reported that they had eaten fish caught in West Michigan during the previous two-week period; the rate is slightly higher in the summer months. Females and advanced/expert anglers are more likely to have eaten fish, while non-whites are less likely to do so. There is a clear tendency for those who are most familiar with the Advisory to report consuming fish during the prior two weeks.

The respondents who ate fish were asked a series of follow-up questions dealing with the species and quantities consumed:

"What kinds of fish did you eat? Did you eat any other species?"

FOR EACH KIND: "How many <species> meals did you eat in the last two weeks?"

The findings show that anglers most often ate bluegill and rarely ate bottomfeeders; those who consumed fish ate an average of 2.6 meals over two weeks. The details will be presented below in combination with data about other family members. First, here are the survey questions dealing with other adults and children in the household:

"Are there any other adults in your household who ate fish in the last two weeks?" "Are there any children in your household who ate fish in the past two weeks?" FOR EACH EATER: "What kinds did they eat?" "How many meals?"

The interviewer recorded the consumption information in a chart that listed each species and each household member. In almost all instances where the angler consumed fish, the spouse and any children in the household also

ate the fish; there are only a handful of cases where others ate fish while the angler did not. Here are the findings for the number and types of species eaten in the two weeks prior to the survey:

*Number of different species eaten in household:*

17% ONE SPECIES ONLY  
8% TWO SPECIES  
2% THREE SPECIES  
1% FOUR SPECIES  
72% NO ONE ATE FISH

*Species of fish eaten in household:*

16% BLUEGILL  
10% PERCH  
5% BASS  
3% SUNFISH  
2% TROUT  
2% WALLEYE  
2% SALMON  
1% PIKE  
.5% CATFISH  
0% SUCKERS  
0% CARP  
1% OTHER

Bluegill were consumed in one-sixth of the households, and perch were consumed in one-tenth of the households. These constitute the majority of all fish that were eaten during the two-week period, as most fish-consuming households were limited to one or two species.

The bottomfeeder category of carp, catfish, and suckers was consumed in less than 1% of the households, ranking below the relatively lightly-eaten species of bass, trout, walleye, salmon, and pike. Catfish were eaten in N=4 households, but no carp or suckers were consumed by any household members during the two weeks prior to the interview.

The table at the top of the next page displays the variety of species consumed by each individual (up to three adults and up to three children) in the fish-eating households:

*Number of different species eaten:*

ANGLER	ADULT#2	ADULT#3	CHILD#1	CHILD#2	CHILD#3	
16%	14%	3%	5%	4%	1%	ONE SPECIES ONLY
8%	7%	1%	3%	1%	1%	TWO SPECIES
2%	1%	1%	1%	1%	0%	THREE SPECIES
1%	1%	0%	0%	0%	0%	FOUR SPECIES
73%	77%	95%	91%	94%	98%	DID NOT EAT FISH

In 27% of all households in overall sample, the angler consumed fish during the two-week period; a second adult (usually the spouse) consumed fish in 23% of the cases. There was a third adult who ate fish in 5% of the households. In 9% of the households, a child also ate a fish meal (a second child ate fish in 5% of the cases, and there was a third child eating fish in 2% of the cases). Most fish eaters consumed only one species during the two-week reporting period, and relatively few ate three or more different species.

It should be noted that the high proportion of non-eating by children and third adults is typically due to the smaller size of many households rather than the additional household members choosing not to eat fish meals. To better interpret these findings, the demographic composition of the households will first be profiled. As indicated below, almost all households in the overall sample had at least two adults, and almost half had at least one child.

*Household Size:*

6%	ONE PERSON	<i>Average = 2.9 Persons</i>
43%	TWO PERSONS	
18%	THREE PERSONS	
21%	FOUR PERSONS	
12%	FIVE OR MORE	

There is a grand total of N=2,019 adults and children in the sampled households. A subtotal of N=538 live in households where fish meals were eaten in the two-week period, and at least N=499 of these ate one or more fish meals (this figure is based on respondents reporting about self and up to two other adults and up to three children; the fish eaters include N=189 for anglers, N=158 for adult#2, N=34 for adult#3, N=64 for child#1, N=40 for child#2, and N=14 child#3). Only N=2 spouses ate fish while the angler did not eat fish, while there are N=33 cases where the angler alone ate fish (in 15 of these 33 cases, the angler was the only member of the household). Thus, it appears that when fish is served in a household, the angler and almost all other members consume the meal.

The next set of findings describe the number of meals that were consumed by those who ate any fish during the measurement period. Again, there are columns of figures for up to three adults and up to three children. The percentages eating various numbers of meals in each column are based on the full sample of N=690 households represented by the anglers who were interviewed, so many cases in the "did not eat" category for third adults and for children are due to smaller household size rather than non-consumption:

*Total fish meals eaten by each family member:*

ANGLER	ADULT#2	ADULT#3	CHILD#1	CHILD#2	CHILD#3	
9%	8%	2%	4%	3%	1%	ONE MEAL
9%	7%	1%	2%	1%	0%	TWO MEALS
4%	3%	1%	2%	1%	1%	THREE MEALS
3%	2%	0%	0%	0%	0%	FOUR MEALS
1%	2%	1%	1%	1%	0%	FIVE-SIX MEALS
1%	1%	0%	0%	0%	0%	SEVEN+ MEALS
73%	77%	95%	91%	94%	98%	DID NOT EAT FISH

*Mean number of fish meals consumed (eaters only):*

ANGLER	ADULT#2	ADULT#3	CHILD#1	CHILD#2	CHILD#3
2.6	2.6	2.6	2.5	2.2	2.7

A total of 1,275 fish meals were eaten by the N=499 household members who consumed fish during the two weeks prior to the survey. For eaters, this represents an average of 2.56 meals; the figure is about 2.6 meals for adults and 2.4 meals for children. About two-thirds of the fish eaters consume just one or two meals in two weeks, although a small but significant subgroup consumes five to ten meals (which inflates the mean number). Converted to a weekly consumption time frame, the average is about 1.3 meals per week.

When these computations are based on the full household sample of N=2,019 individuals, the average number of fish meals eaten drops to just .63 meals per person over the two-week period. Thus, when non-eaters as well as eaters are considered, about one-third of a fish meal is consumed by each person in a typical week.

For the 27% of all anglers who recently ate fish, another question asked these respondents to report the size of the fish portion in the meals that they personally consumed (portion size figures for other household members were not measured due to unreliability of such reports). Three size categories of personal portions were listed by the interviewer, based on approximate number of ounces:

"When you eat a meal of <species>, what is the total amount that you consume: is it a small portion... say, four or five ounces, or a large amount greater than ten ounces, or in between?"

18%	SMALL (4-5 ounces)	<i>Estimated Average = 8.66 ounces</i>
48%	IN BETWEEN	
34%	LARGE (more than 10 ounces)	

The anglers tend to eat fairly sizable portions of fish; about twice as many say that they consume a "large" rather than "small" amount, while almost half fall in the middle range between six and 10 ounces. Assuming that the smaller portions average about four ounces, the "in between" portions average

eight ounces and the larger portions average 12 ounces, it can be estimated that the average meal size is approximately 8.66 ounces.

Across the two-week measurement period, the grand total weight of fish eaten by all anglers in the sample is estimated to be 4,408 ounces. The cumulative amount consumed by most eaters is less than 25 ounces, as shown the chart below:

*Cumulative ounces consumed by anglers:*

73%	0 oz. (no fish eaten)
2%	4 oz.
6%	8 oz.
3%	12 oz.
5%	16 oz.
3%	20-24 oz.
6%	32-52 oz.
2%	60 oz. or more

The mean weight cumulatively consumed *per eater* is 23.32 ounces of fish, or about one and a half pounds. <It should be noted that this mean figure is inflated because great amounts are consumed by a handful of exceptionally heavy fish eaters; the *median* weight consumed by the eaters is 16 ounces, which reflects the amount eaten by the typical angler at the 50th percentile among all eaters>. The mean weight cumulatively consumed for the full sample of anglers (the N=189 eaters and N=501 non-eaters) is 6.39 ounces per person.

Finally, those who living in households where fish meals were consumed during the two-week period were asked a follow-up question to ascertain whether the eaten fish were fresh or preserved:

"Of all the fish eaten in your household in the past two weeks, were any of these fish caught longer than two weeks ago and then frozen, smoked, or dried? IF YES: Would you say all of the fish were caught earlier, most of them, about half, or a few?"

4%	YES: ALL CAUGHT EARLIER
2%	YES: MOST CAUGHT EARLIER
2%	YES: HALF CAUGHT EARLIER
1%	YES: A FEW CAUGHT EARLIER
19%	NO: NONE CAUGHT EARLIER
72%	DID NOT EAT FISH

In 9% of all households, at least some of the meals were prepared with fish that were caught more than two weeks earlier and then frozen, smoked, or dried; in almost all of these cases, half or more of the fish were caught earlier. On the other hand, 19% reported that none of the fish were caught more than two weeks earlier. Thus, more than two-thirds of fish eaten during the two-week period were either fresh or recently preserved.

For all of these fish consumption measures, the findings for the bottom-feeder category of fish will be described in detail. Not one angler or other household member consumed any carp or suckers, while N=4 anglers reported eating catfish. All four spouses also ate the catfish, and one child ate the

catfish in the single household with children. A "medium" number of ounces was consumed in each case. All of the consumed catfish were fresh rather than preserved. None of these anglers fished in the Kalamazoo River. The four anglers were interviewed in June, July, August and October, and lived in Kalamazoo, Allegan, Van Buren, and Ottawa counties.

## "Methods of Preparing and Cooking Fish

Regardless of whether they had recently eaten fish meals, all anglers in the overall sample were questioned about the methods they generally used to prepare and cook fish. Four aspects were measured: filleting the fish, removing/puncturing the skin, trimming the fat, and frying the fish. In addition, respondents were asked if they ate the liver and the eggs. The angler reported whether each of these behaviors was performed "usually", "sometimes", or "never."

An identical series of questions was repeated for three different types of fish, in order to determine variations in preparation, cooking, and eating patterns. The interviewer first asked about bottomfeeders and second referred to bass. The final set of questions dealt with a third type of fish that was eaten most frequently by the angler, which was typically bluegill. Here is the introduction and initial series of items:

"Next, I have some questions about the methods used for preparing and cooking fish in your household. In each case, tell me whether the method is employed usually, sometimes, or never."

"First, lets deal with bottom feeders like carp and suckers. Do you ever eat this type of fish?"

6% YES  
94% NO

"Do you fillet these fish?"

5% USUALLY  
0% SOMETIMES  
1% NEVER  
94% DON'T EAT

"Do you remove or puncture the skin before cooking?"

4% USUALLY  
1% SOMETIMES  
1% NEVER  
94% DON'T EAT

"Do you trim the fat from the fish?"

4% USUALLY  
1% SOMETIMES  
1% NEVER  
94% DON'T EAT

"Do you fry the fish?"

3% USUALLY  
2% SOMETIMES  
1% NEVER  
94% DON'T EAT

"Do you eat the liver?"

0% USUALLY  
0% SOMETIMES  
6% NEVER  
94% DON'T EAT

"Do you eat the eggs?"

1% USUALLY  
0% SOMETIMES  
5% NEVER  
94% DON'T EAT

Only 6% of all anglers report that they eat carp, suckers, and other bottomfeeders. Most of these eaters say that they usually fillet the fish, remove/puncture the skin, and trim the fat; about half usually fry the fish. Almost none eat either the liver (N=1) or the eggs (N=4). Based on these findings, it can be concluded that less than 1% of all West Michigan anglers eat untrimmed and unskinned bottomfeeders, and that less than 1% eat the liver and eggs. As shown in Appendix A, males and older anglers tend to eat these species more than females and younger anglers. There are no differences based on knowledge about the Advisory or other demographic factors.

The identical set of six items was posed to the respondents who replied affirmatively to the screening question about bass:

"Second, do you ever eat smallmouth or largemouth bass?"

59% YES  
41% NO

"Do you fillet these fish?"

53% USUALLY  
3% SOMETIMES  
3% NEVER  
41% DON'T EAT

"Do you remove or puncture the skin before cooking?"

42% USUALLY  
5% SOMETIMES  
12% NEVER  
41% DON'T EAT

"Do you trim the fat from the fish?"

36% USUALLY  
6% SOMETIMES  
17% NEVER  
41% DON'T EAT

"Do you fry the fish?"

42% USUALLY  
12% SOMETIMES  
5% NEVER  
41% *DON'T EAT*

"Do you eat the liver?"

0% USUALLY  
1% SOMETIMES  
58% NEVER  
41% *DON'T EAT*

"Do you eat the eggs?"

1% USUALLY  
2% SOMETIMES  
56% NEVER  
41% *DON'T EAT*

The bass species are far more popular than bottomfeeders, as three-fifths of all anglers in the survey say that they eat smallmouth or largemouth bass. A very high proportion of these bass eaters usually fillet the fish, and a large majority usually remove/puncture the skin. About three-fifths of the eaters usually trim the fat, but a significant minority never trim the fat (17% of all anglers, which is 29% of those who eat bass). Bass are usually fried, although many occasionally use other cooking methods. Very few respondents say that they ever eat the liver or the eggs.

Appendix A presents data on the question about bass consumption for subgroups of the sample. There are mostly minor differences, except for the higher rate of bass-eating among non-whites and among those living in counties near the Kalamazoo River.

To ascertain methods used with additional species, a preliminary question was posed to identify which other type of fish is the most frequently-consumed by the angler:

"What other type of fish do you eat most frequently?"

39% BLUEGILL  
15% PERCH  
7% TROUT  
7% WALLEYE  
5% SUNFISH  
4% SALMON  
3% PIKE  
2% OTHER BASS  
6% OTHER  
12% *DON'T EAT OTHER TYPES*

The vast majority of the respondents indicate that they eat another type of fish besides the bass and bottomfeeder species that were already measured. Bluegill, the species which is most widely caught by those residing in the Kalamazoo River basin area, is the also most frequently eaten fish. The only other species with even a modest number of eaters is perch.

The table below presents the aggregate findings for all of these species in the "overall" column, and then presents separate columns of data for bluegill and for perch. Results for the remaining species are combined into an "other" column because there are insufficient sample sizes for individual tabulations.

Fillet:	Overall	Bluegill	Perch	Other
USUALLY	74%	32%	13%	29%
SOMETIMES	5%	2%	1%	2%
NEVER	9%	5%	1%	3%
DON'T EAT	12%	61%	85%	66%

Remove skin:

USUALLY	58%	24%	10%	25%
SOMETIMES	7%	2%	1%	3%
NEVER	23%	13%	4%	6%
DON'T EAT	12%	61%	85%	66%

Trim fat:

USUALLY	52%	20%	10%	23%
SOMETIMES	7%	4%	1%	1%
NEVER	29%	15%	4%	10%
DON'T EAT	12%	61%	85%	66%

Fry fish:

USUALLY	61%	32%	11%	17%
SOMETIMES	16%	5%	3%	8%
NEVER	11%	2%	1%	9%
DON'T EAT	12%	61%	85%	66%

Eat liver:

USUALLY	1%	1%	0%	0%
SOMETIMES	0%	0%	0%	0%
NEVER	87%	38%	15%	34%
DON'T EAT	12%	61%	85%	66%

Eat eggs:

USUALLY	1%	0%	0%	1%
SOMETIMES	3%	1%	1%	1%
NEVER	84%	38%	14%	32%
DON'T EAT	12%	61%	85%	66%

A majority of all anglers state that they usually perform the following with their most frequently-eaten species: fillet the fish (74%), fry it (61%), puncture or remove the skin (58%), and trim the fat (52%). On the other hand, very few eat the eggs or liver. The data for bluegill show a generally similar pattern, except that this species is relatively less likely to be trimmed and more likely to be fried.

It is difficult to compare the results for preparation and cooking of different species measured in the survey because the number of eaters varies for each species. To facilitate direct comparisons, the percentages of anglers who reply "usually" (vs. "sometimes" or "never") can be recomputed to adjust for the varying subsample sizes; for example, 32% usually fillet bluegill (N=221 out of the full sample of N=690), but this number who fillet constitutes 82% of the subsample of N=270 who eat bluegill. Here are the adjusted figures for the five categories of fish presented in this section, showing the percent reporting they usually perform each behavior:

	<i>Bottom</i> (N=44)	<i>Bass</i> (N=410)	<i>Bluegill</i> (N=270)	<i>Perch</i> (N=102)	<i>Other</i> (N=233)
Fillet	80%	89%	82%	87%	85%
Remove skin	73%	72%	62%	67%	73%
Trim fat	71%	61%	51%	67%	68%
Fry fish	57%	71%	82%	74%	50%
Eat liver	2%	0%	2%	0%	0%
Eat eggs	9%	1%	1%	2%	2%

These adjusted findings show that filleting occurs at approximately the same rate for all species. Both skin puncturing/removal and fat trimming are performed slightly less often by those eating bluegill; indeed, only half of those preparing bluegill trim the fat. Frying is slightly more prevalent when bluegill are cooked, while bottomfeeders and other fish are less likely to be fried. Consumption of the liver is rare for all species. Finally, few anglers eat any type of fish egg; it should be noted that the seemingly higher 9% figure for bottomfeeders is based on only N=4 anglers out of N=44 who eat this type of fish.

## Responses to Fish Consumption Advisory Warnings

The final major section of the survey examined awareness of the Michigan Department of Public Health Advisory and the consequent changes in fish catching and eating patterns. The anglers were first asked a basic awareness question that did not specify any details about the Advisory. For those who were uncertain or who could not recall the Advisory, a follow-up item supplied additional information to help clarify the subject; they were asked if they had heard anything warnings about unsafe fish in certain bodies of water. Here is the wording of the items:

"Are you aware of any Fish Consumption Advisory warnings issued by the Michigan Department of Public Health?" *IF NO OR NOT SURE:* These warnings tell which bodies of water contain certain types of fish that are unsafe to eat because of toxic chemical contamination. Have you heard anything about that?"

67% YES: AWARE  
9% NOT AWARE (BUT HEARD)  
24% NOT AWARE (AND NOT HEARD)

Two-thirds of the respondents indicated that they are aware of the MDPH Advisory, and an additional 9% replied affirmatively when asked in a follow-up question if they had "heard anything" about warnings concerning unsafe fish. The remaining one-fourth of the sample who had heard anything were considered unaware and thus were not asked any further questions on this topic.

The 67% awareness rate in the overall sample varies substantially across the subgroups listed in Appendix A. Anglers who are older, male, employed full-time and highly educated are much more aware, as are those with greater fishing ability. Awareness is also higher in the counties nearest the Kalamazoo River.

The respondents were then asked if the warning applies to any bodies of water in the region. An open-end follow-up requested that they identify specific lakes and rivers to which the warning applies:

"Do you know if the warning applies to any rivers or lakes in the southwest part of the state? *IF YES:* Which bodies of water?"

40% YES: BODIES OF WATER SPECIFIED  
6% YES: NO LOCATION SPECIFIED  
13% NO: WARNING DOESN'T APPLY  
17% NOT SURE IF WARNING APPLIES  
24% NOT AWARE OF WARNING

### *Locations specified:*

25% KALAMAZOO RIVER  
1% PORTAGE CREEK  
21% LAKES  
2% OTHER RIVERS

First, 46% of the respondents realize that the warning applies to regional bodies of water, although 6% of them could not identify a specific location. By contrast, 13% think that the warning did not apply to any local lakes or rivers. The remaining 17% are uncertain about which locations are mentioned in the warning.

Among the 40% of all anglers who responded to the open-end item by identifying specific bodies of water, more than three-fifths cited the Kalamazoo River. This constitutes 25% of the total sample. In addition, about half cited a lake (either inland lakes or Lake Michigan), which is 21% of the overall sample. A small proportion specified another river (such as the Grand River), but only a few mentioned Portage Creek. It should be noted that about one-seventh of the sample mentioned more than one body of water, so the percentages in the table above sum to more than 40%.

Again, there are substantial subgroup differences. Fully 38% of the anglers living in the nearby counties (Kalamazoo, Allegan, and Calhoun) mentioned the Kalamazoo River, compared to 14% of those living further away. Males, full-time workers, advanced/expert anglers, and highly educated respondents are also more likely to know that the warning applies to the river.

The next pair of Advisory questions focused on implications of the warnings for both the types of fish sought and the choice of fishing sites. The following questions were posed to respondents who were aware or had heard of the warning:

"As a result of a consumption advisory warning, have you changed the type of fish species that you attempt to catch?"

5% YES  
71% NO  
24% NOT AWARE OF WARNING

"Have you avoided fishing in certain locations because of the warnings?"

29% YES  
47% NO  
24% NOT AWARE OF WARNING

Only 5% of the sample indicated that they had changed the types of fish that they sought to catch as a result of the warning. These anglers were asked an open-end question: "Which fish do you try to avoid?" A total of 15 anglers mentioned one or more of the bottomfeeder species, primarily carp; this is 2% of the overall sample. Smaller numbers cited salmon, trout, and bass as species that they no longer attempted to catch. These relatively low proportions may be due to the fact that anglers had not tried to catch certain types of fish before the warning was issued, so there was no change to report.

A far larger portion of the sample has adjusted the locations where they go to fish. As a result of the warnings, 29% of all anglers stated that they are avoiding fishing in certain lakes or rivers. As shown in Appendix A, more than half of those who know that the warning applies to the Kalamazoo River say that they've avoided fishing in Advisory-specified waters. Better-educat-

ed anglers are also more likely to have changed locations.

Following the fishing questions, another set of items focused on changes in eating patterns and methods of preparation as a result of the Advisory. There are four questions dealing with these responses:

"Have you avoided eating all fish from waters specified in the advisory?"

42% YES  
34% NO  
24% NOT AWARE OF WARNING

"Have you avoided eating certain types of fish species from these waters?"

7% YES  
69% NO  
24% NOT AWARE OF WARNING

"Have you reduced the quantity of fish you eat from these waters?"

8% YES  
68% NO  
24% NOT AWARE OF WARNING

"Have you changed the way that you trim or cook the fish from these waters?"

7% YES  
69% NO  
24% NOT AWARE OF WARNING

Fully 42% of all anglers in the sample have avoided eating all fish caught in the waters specified in the Advisory. Those who know about the Kalamazoo River warning are twice as likely to avoid consumption, compared to those who don't know (Appendix A). In addition, respondents who are highly educated, employed full-time, and older tend to avoid eating all specified fish.

Among the remaining anglers who do not avoid eating all fish covered in the Advisory, 7% have avoided eating certain species from these waters, and an additional 8% have reduced the quantity of fish that they consume from the affected rivers or lakes. Thus, more than half have responded to the warning by changing the types and amounts of fish they eat. Moreover, 7% have altered their trimming or cooking methods when preparing fish caught from the waters cited in the warnings.

## Other Freshwater Animals

After completing the questions about fish catching and eating, respondents were also asked about other biota, particularly turtles, frogs, and crayfish. The initial pair of screening questions sought to identify the small proportion of the sample who had attempted to catch these freshwater animals in the past year and in the past two weeks:

"Besides fish, have you attempted to catch any other types of freshwater animals such as turtles, frogs, or crayfish during the past year?"

6% YES  
94% NO

"Have you attempted to catch any of these animals in the past two weeks?"

1% YES  
99% NO

Only 6% of all anglers in the sample reported an attempt to catch other freshwater animals such as turtles, frogs, or crayfish in the past year, and just 1% had done so in the prior two-week period. The small segment of N=7 respondents who had attempted to catch these biota in the prior two weeks were asked the follow-up questions about the locations and types of animals, and whether any were taken home:

"What were the animals you attempted to catch and where did you try to catch them?"

0.9% TURTLE  
0.4% FROG  
0.3% CRAYFISH  
0.1% SNAKES  
99% DID NOT ATTEMPT

"Did you take any of these animals home to be eaten by yourself or other people? Which ones?"

0.7% TURTLE  
0.1% FROG  
0.0% CRAYFISH  
0.0% SNAKES  
99% DID NOT ATTEMPT

Six of the seven anglers reported that they attempted to catch turtles in lakes, ponds, and creeks, and five of them took home turtles. Three individuals attempted to catch frogs, and one took home frogs. Two sought to catch crayfish and one sought to catch watersnakes, but none were taken home. None attempted to catch these freshwater animals in the Kalamazoo River. Most of these attempts occurred in the summer: N=4 in July, N=2 in August, and N=1 in October. The respondents lived in the following counties: N=3 Eaton, N=2 Van

Buren, N=2 Kalamazoo.

Next, the interviewer posed questions about eating the biota during the two-week period prior to the survey day:

"Did you eat any of these animals in the last two weeks? What kinds of animals did you eat?"

0.1% YES

0.9% NO

99% DID NOT ATTEMPT

Only one person reported eating any biota during the previous two weeks; the type of animal consumed was turtle. This respondent was asked the full series of questions paralleling the fish-consumption items:

"How many <animal> meals did you eat in the last two weeks?"

"When you eat a meal of <animal>, what is the total amount that you consume... is it a small portion (say, four or five ounces) or a large amount (greater than ten ounces), or in between?"

"Are there any other adults in your household who ate these animals in the last two weeks?"

"What kinds did they eat? How many meals?"

"Are there any children in your household who ate these animals in the past two weeks?"

"What kinds did they eat? How many meals?"

"Of all the animals eaten in your household in the past two weeks, were any of these caught longer than two weeks ago and then frozen, smoked, or dried? IF YES: Would you say all of the animals were caught earlier, most of them, about half, or a few?"

Because only a single individual ate any biota, the findings will be described verbally rather than charted numerically. This person is a male in his 30's living in Kalamazoo County who caught a turtle at Austin Lake. He consumed one small-size meal that was fresh rather than preserved. Because he lives alone, no other adults or children ate turtle meals.

## Background Characteristics: Demographics and Fishing Experience

At the end of the interview, all respondents were asked a series of background questions dealing with demographic characteristics and fishing experience. The two experience items focused on the number of years they had fished and their level of angling ability:

"About how many years have you been fishing in Michigan?"

3%	ONE TO FOUR YEARS	<i>Average = 28 Years</i>
11%	FIVE TO TEN YEARS	
8%	ELEVEN TO FIFTEEN YEARS	
13%	SIXTEEN TO TWENTY YEARS	
20%	TWENTY ONE TO THIRTY YEARS	
45%	MORE THAN THIRTY YEARS	

"How would you describe your fishing ability: are you a beginner, intermediate, advanced, or expert?"

10%	BEGINNER
50%	INTERMEDIATE
34%	ADVANCED
6%	EXPERT

The sample tends to be highly experienced and proficient in their fishing background. Almost two-thirds of the anglers in the survey have fished for more than 20 years in Michigan; only 14% have fished for 10 years or less. Two-fifths of the respondents consider themselves to be advanced or expert anglers, and half say they are intermediate; only one-tenth rate their ability at the beginning level.

The demographic items measured household size, age, gender, education, employment, income, and race:

"How many persons currently live in your household?"

6%	ONE	<i>Average = 2.9 Persons</i>
43%	TWO	
18%	THREE	
21%	FOUR	
12%	FIVE OR MORE	

"What is your age level... are you in your 20's, 30's, 40's, 50's, 60's, or older?"

6%	TEENS	<i>Average = 44 Years Old</i>
14%	TWENTIES	
21%	THIRTIES	
20%	FORTIES	
19%	FIFTIES	
14%	SIXTIES	
6%	OLDER	

Gender:

72% MALE  
28% FEMALE

"What is the highest level of schooling that you completed?"

13% LESS THAN 12TH GRADE  
36% HIGH SCHOOL GRADUATE  
25% SOME COLLEGE/TECHNICAL SCHOOL  
18% FOUR-YEAR COLLEGE GRADUATE  
7% GRADUATE SCHOOLING  
1% REFUSED

"Which of the following categories best describes your current employment situation? Are you a full-time worker, part-time worker, seasonal worker, unemployed, retired, student, or homemaker?"

56% FULL-TIME  
6% PART-TIME  
1% SEASONAL  
4% UNEMPLOYED  
22% RETIRED  
6% STUDENT  
5% HOMEMAKER

"Is your total household income above or below \$30,000 per year?"

IF ABOVE: Is it above or below \$40,000 per year?

IF ABOVE: Is it above or below \$50,000 per year?

IF BELOW: Is it above or below \$20,000 per year?

IF BELOW: Is it above or below \$10,000 per year?"

7%	UNDER \$20,000	Average = \$38,500
17%	\$20,000-\$29,999	
20%	\$30,000-\$39,999	
22%	\$40,000-\$49,999	
17%	ABOVE \$50,000	
17%	REFUSED	

"Which of the following describes your ethnic background: White, African-American, Hispanic, Native American, Asian-American, or Other?"

96% WHITE  
2% AFRICAN-AMERICAN  
1% HISPANIC  
1% NATIVE-AMERICAN  
0% ASIAN-AMERICAN

The sample is predominantly male (72%), white (96%), and middle-income (average = \$38,500). Less than one-third of the anglers are female. Very few

Of these southwest Michigan respondents are minorities: 2% are African American, 1% are Hispanic, and 1% are Native American. Of those disclosing their household income, 71% fall in the \$20,000 to 49,999 range.

Half have a high school education or less, and the other half have post-secondary schooling (including one-quarter who have attained at least a four-year college degree). The average age is 44 years old, with approximately one-fifth of the sample in each of these five age categories: under age 30, thirties, forties, fifties, and age 60 or older.

Regarding employment status, 56% work full-time and an additional 7% are employed part-time or seasonally. Retirees constitute slightly more than one-fifth of the sample, although half of these individuals are under age 65. Small segments of the sample are homemakers, students, and unemployed.

Finally, 94% of the anglers live with at least one other person. One-third of the households have four or more persons. The average household size is 2.9 persons. Thus, the respondent sample size of N=690 expands to N=2,019 for questions about fish consumption patterns.

## Appendix A: Cross Tabulations on Key Items

This set of tables presents the responses of subgroups of respondents on nine important questions posed in the interview. In each case, the percent who gave the key answer is shown for the overall sample and for two or three segments on seven demographic variables, one fishing ability variable, and two advisory knowledge variables. For example, the first set of data shows that 48% of the sample fished during the two-week period prior to the survey; focusing on the male segment, 53% reported that they fished, while 41% of the females fished.

The sample was divided into two subgroups on most of these variables. The sizes of the certain segments are relatively small in the case of non-whites, females, and those who know about the Advisory applying to the Kalamazoo River; thus, the figures are not as stable for these respondents. Here are the definitions for each of the subgroups:

*Male* = Respondent is a male angler  
*Female* = Respondent is a female angler

*Younger* = Angler is under 40 years old  
*Older* = Angler is age 40 or older

*Low Education* = High school degree or less  
*High Education* = More than 12 years of schooling

*White* = Angler is white  
*Non-white* = Angler is minority ethnic background

*Full-time* = Angler works at full-time job  
*Non-full* = Angler works parttime or is not employed

*Near counties* = Angler lives in counties near Kalamazoo River  
(Kalamazoo, Allegan, and Calhoun)  
*Far counties* = Angler lives further from Kalamazoo River  
(Eaton, Barry, Van Buren, Ottawa, and Jackson)

*Know Advisory* = Angler is aware of Advisory warning  
*Unaware* = Angler is not aware of Advisory warning

*Know Kalamazoo* = Angler knows warning applies to Kalamazoo River  
*Don't know* = Angler doesn't specify Kalamazoo River

*Low Ability* = Respondent is beginner or intermediate angler  
*High Ability* = Respondent is advanced or expert angler

*Low Income* = Household income is under \$30,000  
*Med Income* = Household income is between \$30,000 and \$39,999  
*High Income* = Household income is \$40,000 or more

The 10 most significant questions from the survey are listed below in summary form, along with the key response category for which the findings are presented:

#### Fished in two week period prior to survey (% YES)

48% Overall sample

53% Male	48% Younger
41% Female	49% Older
45% Low Education	51% White
53% High Education	25% Non-white
46% Full-time	48% Near counties
52% Non-full	49% Far counties
51% Know Advisory	53% Know Kalamazoo
43% Unaware	46% Don't know
42% Low Ability	47% Low Income
61% High Ability	52% Med Income
	49% High Income

#### Angler usually takes home fish caught (% TAKE ALL or TAKE MOST)

52% Overall sample

51% Male	45% Younger
52% Female	56% Older
45% Low Education	52% White
55% High Education	41% Non-white
52% Full-time	54% Near counties
51% Non-full	50% Far counties
53% Know Advisory	55% Know Kalamazoo
50% Unaware	51% Don't know
52% Low Ability	57% Low Income
51% High Ability	53% Med Income
	49% High Income

Angler caught bottomfeeder fish during two-week period (% YES)

2% Overall sample

2% Male	3% Younger
2% Female	1% Older
2% Low Education	2% White
2% High Education	4% Non-white
2% Full-time	2% Near counties
2% Non-full	2% Far counties
2% Know Advisory	2% Know Kalamazoo
1% Unaware	2% Don't know
3% Low Ability	2% Low Income
1% High Ability	0% Med Income
	2% High Income

Angler ate fish meals during two-week period (% ONE OR MORE)

27% Overall sample

24% Male	25% Younger
37% Female	29% Older
26% Low Education	28% White
29% High Education	18% Non-white
25% Full-time	26% Near counties
31% Non-full	29% Far counties
33% Know Advisory	36% Know Kalamazoo
17% Unaware	24% Don't know
23% Low Ability	29% Low Income
34% High Ability	28% Med Income
	31% High Income

Angler ever eats bottomfeeder fish (% YES)

6% Overall sample

7% Male	3% Younger
4% Female	8% Older
6% Low Education	6% White
6% High Education	4% Non-white
6% Full-time	6% Near counties
5% Non-full	6% Far counties

6% Know Advisory	7% Know Kalamazoo
6% Unaware	6% Don't know
5% Low Ability	7% Low Income
7% High Ability	7% Med Income
	6% High Income

#### Angler eats smallmouth or largemouth bass fish (% YES)

59% Overall sample

59% Male	63% Younger
60% Female	57% Older
58% Low Education	58% White
60% High Education	75% Non-white
61% Full-time	64% Near counties
57% Non-full	55% Far counties
57% Know Advisory	63% Know Kalamazoo
63% Unaware	58% Don't know
62% Low Ability	63% Low Income
56% High Ability	54% Med Income
	58% High Income

#### Angler aware of Advisory warning (% YES)

67% Overall sample

70% Male	62% Younger
59% Female	71% Older
59% Low Education	68% White
75% High Education	58% Non-white
71% Full-time	71% Near counties
62% Non-full	63% Far counties
100% Know Advisory	100% Know Kalamazoo
0% Unaware	57% Don't know
23% Low Ability	62% Low Income
34% High Ability	71% Med Income
	70% High Income

#### Angler knows warning applies to Kalamazoo River (% MENTIONS RIVER)

25% Overall sample

28% Male	23% Younger
17% Female	26% Older

18% Low Education	25% White
31% High Education	21% Non-white
31% Full-time	38% Near counties
17% Non-full	14% Far counties
36% Know Advisory	100% Know Kalamazoo
--% Unaware	0% Don't know
20% Low Ability	22% Low Income
32% High Ability	28% Med Income
	29% High Income

#### Angler avoids fishing in Advisory-specified waters (% YES)

29% Overall sample

30% Male	27% Younger
27% Female	31% Older
24% Low Education	28% White
35% High Education	39% Non-white
32% Full-time	31% Near counties
26% Non-full	27% Far counties
41% Know Advisory	55% Know Kalamazoo
--% Unaware	20% Don't know
27% Low Ability	26% Low Income
32% High Ability	32% Med Income
	32% High Income

#### Angler avoids eating all fish from Advisory-specified waters (% YES)

42% Overall sample

43% Male	38% Younger
42% Female	45% Older
37% Low Education	42% White
48% High Education	46% Non-white
46% Full-time	45% Near counties
39% Non-full	40% Far counties
57% Know Advisory	68% Know Kalamazoo
--% Unaware	34% Don't know
41% Low Ability	36% Low Income
45% High Ability	45% Med Income
	46% High Income